N92-12794

Theoretical Spectroscopy of Comets

Astronomy Program
University of Maryland
College Park, Maryland

Michael F. A'Hearn

Strategy

We calculate theoretical spectra of various emitting species in cometary comae both to investigate physical parameters that are measurable with cometary spectra and to provide fluorescence efficiencies for the derivation of abundances from fluxes.

Progress and Accomplishments

i) Work on the fluorescence equilibrium of S_2, completed in the previous year, was published in *Icarus*.

ii) We completed our modelling of SO and SO_2, compared the results with IUE spectra of a number of comets, and concluded that neither species was present at a level far below that expected if S_2 is ubiquitous in comets and is produced by irradiation of sulfur compounds in icy grain mantles. Paper has been submitted.

iii) Continued collaboration at a low level with D. Schleicher on modelling OH fluorescence to study the effects of quenching the lambda doublet by collisions and the Greenstein effect. Most effort at Maryland was in preparing IUE spectra for comparison with the model.

Projected Accomplishments

i) Complete our study of the temporal variability of S_2 in IRAS-Araki-Alcock using ground-based spectra obtained by S. Larson.

ii) Calculate theoretical models for comparison with high-resolution spectra of comet Austin obtained by H. Spinrad. Much of the work will become a thesis for Spinrad's student but we will provide models for specific species including CO_2^+, C_3, and NH_2.

Publications

Kim, S. J., M. F. A'Hearn, & S. M. Larson 1990. Multi-Cycle Fluorescence: Applications to S_2 in Comet IRAS-Araki-Alcock 1983VII, *Icarus*, **87**, 440-451

Kim, S. J. & M. F. A'Hearn 1991. Upper Limits on SO and SO_2, *Icarus*, in press.